

Rec'd PCTO 20 APR 2005

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
6 May 2004 (06.05.2004)

PCT

(10) International Publication Number
WO 2004/038038 A3

(51) International Patent Classification⁷: C12Q 1/68,
C12P 19/34, C07D 279/16

MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT,
RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number:
PCT/US2003/033429

(22) International Filing Date: 22 October 2003 (22.10.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/420,717 23 October 2002 (23.10.2002) US
60/439,978 14 January 2003 (14.01.2003) US

(71) Applicants (for all designated States except US): UNIVERSITY OF UTAH RESEARCH FOUNDATION [US/US]; 615 Arapeen Drive, Suite 10, Salt Lake City, UT 84108 (US). IDAHO TECHNOLOGY, INC. [US/US]; 390 Wakura Way, Salt Lake City, UT 84108 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): WITTWER, Carl, T. [US/US]; 3479 South Crestwood Drive, Salt Lake City, UT 84109 (US). DUJOLS, Virginie, E. [FR/US]; 2119 Royal Coventry Court, N° 31, Salt Lake City, UT 84121 (US). REED, Gudrun [DE/US]; 1122 South McClelland, Salt Lake City, UT 84105 (US). ZHOU, Luming [CA/US]; 373 North H Street, Salt Lake City, UT 84103 (US).

(74) Agent: POWLICK, Jill, T.; ICE MILLER, One American Square, Box 82001, Indianapolis, IN 46282-0002 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, LZ, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, LZ, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Published:

— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
22 July 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: AMPLICON MELTING ANALYSIS WITH SATURATION DYES

(57) Abstract: Methods are provided for nucleic acid analysis wherein a target nucleic acid that is at least partially double stranded is mixed with a dsDNA binding dye having a percent saturation of at least 50% to form a mixture. In one embodiment, the nucleic acid is amplified in the presence of the dsDNA binding dye, and in another embodiment a melting curve is generated for the target nucleic acid by measuring fluorescence from the dsDNA binding dye as the mixture is heated. Dyes for use in nucleic acid analysis and methods for making dyes are also provided.

WO 2004/038038 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/33429

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C12Q 1/68; C12P 19/34; C07D 279/16
US CL : 435/6, 91.2; 544/51

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 435/6, 91.2; 544/51

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

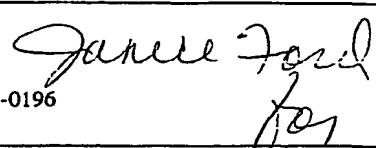
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	RIRIE, K. M. Product differentiation by analysis of DNA melting curves during the polymerase chain reaction. Anal. Biochem., 1997, Vol. 245, pages 154-160. entire document, especially page 154.	1, 14, 16, 24-28, 31, 45-48
---		-----
Y	US 6,506,568 B2 (SHRIVER et al.) 14 January 2003, (14.01.2003), entire document, especially column 3, lines 20-67, column 4, lines 1-26	2-8, 13, 15, 17-23, 29-30, 32
Y	US 5,658,751 A (YUE et al) 19 August 1997 (19.8.1997), entire document	1-8, 13-28, 31-37, 39-48, 63-71, 74-75
Y	US 6,437,141 B2 (RANDALL et al) 20 August 2002 (20.8.2002), entire document	9-12, 49-69, 72-82
X	US 6,174,670 B1 (WITTWER et al.) 16 January 2001 (16.1.2001), entire document, especially, column 11, lines 10-38, column 22, lines 54-64,	1, 5-7, 13-14, 17-28, 30-33, 39-44
---		-----
Y		34-38, 45-47, 63-71

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"B" earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 16 April 2004 (16.04.2004)	Date of mailing of the international search report 16 MAY 2004
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Suryapraba Chunduru Telephone No. 703-308-0196 

INTERNATIONAL SEARCH REPORT

PCT/US03/33429

Continuation of B. FIELDS SEARCHED Item 3:
Biosis, Embase, Caplus, Medline, Lifesci, EAST databases
search terms: LCGreen, cyanine dyes, PCR, SYBR Green